Nano Spray Drying Technique as a Novel Approach To Formulate Stable Econazole Nitrate Nanosuspension Formulations for Ocular Use

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Abstract

The eﬀect of using methyl-ϐ-cyclodextrin and hydroxypropyl-ϐ-cyclodextrin as carriers for econazole nitrate nanoparticles prepared by nano spray dryer was explored in this work. Stabilizers, namely, poly(ethylene oxide), polyvinylpyrrolidone k30, poloxamer 407, Tween 80, and Cremophor EL, were used. The nano spray dried formulations revealed almost spherical particles with an average particle size values ranging from 121 to 1565 nm and zeta potential values ranging from ī0.8 to ī2.5 mV. The yield values for the obtained formulations reached 80%. The presence of the drug in the amorphous state within the nanosuspension matrix system signiýcantly improved drug release compared to that for pure drug. Combination of hydroxypropyl-ϐ-cyclodextrin with Tween 80 achieved an important role for preserving the econazole nanosuspension from aggregation during storage for one year at room temperature as well as improving drug release from the nanosuspension. This selected formulation was suspended in chitosan HCl to increase drug release and bioavailability. The in vivo evaluation on albino rabbitôs eyes demonstrated distinctly superior bioavailability of the selected formulation suspended in chitosan compared to its counterpart formulation suspended in buﬀer and crude drug suspension due to its mucoadhesive properties and nanosize. The nano spray dryer could serve as a one step technique toward formulating stable and eﬀective nanosuspensions.

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